DATA ENCODING APPARATUS AND DATA ENCODING METHOD

[0001] This application claims priority from Korean Patent Application No. 10-2015-0144856 filed on Oct. 16, 2015 in the Korean Intellectual Property Office, the disclosure of which is incorporated herein by reference in its entirety.

BACKGROUND

[0002] 1. Technical Field

[0003] At least one example embodiment of the inventive concepts relates to a data encoding apparatus and a data encoding method.

[0004] 2. Description of the Related Art

[0005] With the development and distribution of hardware capable of reproducing and storing high-resolution or high-quality video contents, the necessity of a video codec for effectively encoding or decoding high-resolution or high-quality video contents has increased. According to a conventional video codec, a video is encoded by a limited coding method based on a macroblock having a predetermined size.

[0006] A video codec reduces the amount of data by a prediction technique using the characteristics of video images being temporally or spatially correlated with each other at a high degree. According to the prediction technique, image information is recorded using temporal or spatial distance between images, prediction errors, or the like in order to predict the current image using the peripheral image.

SUMMARY

[0007] According to at least some example embodiments of the inventive concepts, a data encoding apparatus includes a memory storing computer-readable instructions; and one or more processors configured to execute the computer-readable instruction such that the one or more processors are configured to, receive first video data in a macroblock unit, determine a first rounding offset value using the first video data, create second video data by applying the first rounding offset value to the first video data, determine a second rounding offset value, which is different from the first rounding offset value, using the second video data, and create a quantized coefficient by applying the second rounding offset value to the first video data.

[0008] The one or more processors may be configured to execute the computer-readable instruction such that the one or more processors are configured to determine the first rounding offset value depending on a prediction mode or a level value.

[0009] The one or more processors may be configured to execute the computer-readable instruction such that the one or more processors are configured to determine the second rounding offset value using the number of data having a level value of 0 between first data and second data.

[0010] The data encoding apparatus may further include one-dimensionally arranging the second video data, wherein the first data is final data having a level value of not 0 in the one-dimensionally arranged second video data.

[0011] The second data may be data that has a level value of not 0 and is nearest to the first data in the one-dimensionally arranged second video data.

[0012] The one or more processors may be configured to execute the computer-readable instruction such that the one or more processors are configured to determine the first or second rounding offset value using a previously stored lookup table.

[0013] The one or more processors may be further configured to execute the computer-readable instruction such that the one or more processors are configured to calculate the first or second rounding offset value depending on a first equation.

[0014] The rounding offset calculating unit may be disposed in the quantization unit.

[0015] The first video data may be data transformed into a frequency domain.

[0016] The macroblock unit may include 4×4 pixel or 16×16 pixel.

[0017] According to at least some example embodiments of the inventive concepts, a data encoding apparatus includes a memory storing computer-readable instructions; and one or more processors configured to execute the computer-readable instruction such that the one or more processors are configured to, receive 1st to nth video data, determine 1st to nth quantized coefficients based on the 1st to nth video data, n being a natural number equal to or greater than 2, determine 1st to nth rounding offset values based on the 1st to nth quantized coefficients, determine 1st to nth transformed quantized coefficients by applying the 1st to nth rounding offset values to the 1st to nth quantized coefficients, and one-dimensionally arrange the 1st to nth transformed quantized coefficients depending on a first rule.

[0018] The one or more processors may be configured to execute the computer-readable instruction such that the one or more processors are configured to determine additional rounding offset values using the one-dimensionally arranged 1st to nth transformed quantized coefficients.

[0019] The one or more processors may be configured to execute the computer-readable instruction such that the one or more processors are configured to determine the additional rounding offset values by using a final kth quantized coefficient having a level value of not 0 and a k−1th quantized coefficient that has a level value of not 0 and is nearest to the kth quantized coefficient, among the 1st to nth transformed quantized coefficients.

[0020] The one or more processors may be configured to execute the computer-readable instruction such that the one or more processors are configured to determine the additional rounding offset values by using the number of quantized coefficients having a level value of 0 between the kth quantized coefficient and the k−1th quantized coefficient.

[0021] The one or more processors may be configured to execute the computer-readable instruction such that the one or more processors are configured to determine the additional rounding offset values by using a lookup table previously stored in memory.

[0022] The one or more processors may be configured to execute the computer-readable instruction such that the one or more processors are configured to determine the additional rounding offset values based on a first equation.

[0023] According to at least some example embodiments of the inventive concepts, a data encoding apparatus includes a memory storing computer-readable instructions; and one or more processors configured to execute the computer-readable instruction such that the one or more processors are configured to, receive a residual block, transform video data in a spatial domain into video data in a frequency domain to create a transformed coefficient, quan-